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AUTHOR Hubin, Allen J.
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ABSTRACT

Granted that live, interactive television can provide effective university instruction for industrial employees, the University-Industry Television for Education (UNITE) system, operated by the University of Minnesota, presents a number of problems for its industrial users. In reexamining their own commitment to UNITE and the sizable financial investment involved, one of the eight participating companies offered the following criticisms of the program's effectiveness: the degree program orientation of the system does not serve a company with low degree pressure; the needs of employees without degree interests are so diversified that identifying common areas of educational need is difficult; the value mismatch between the academic and the industrial information systems results in courses that do not meet industrial training needs; the heterogeneity of the companies involved reduces the number of courses aimed at special interests; professors of desired courses can refuse to take part in the program; and scheduling presents difficulties in the industrial work day. Other areas that are potentially problematic include vague catalog descriptions, timing of homework assignments and tests, quality teaching, and use of the talk-back classroom feature. (MAI)

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"VIDEO NETWORK INSTRUCTION: A CRITICAL VIEW"

Allen J. Hubin
Manager, Technical Education and Training
Education, Training and Development Dept., 3M Co.

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

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UNITE (UNiversity-Industry Television for Education) is one of a number of systems in the U. S. designed to carry regular, accredited, daytime university instruction to nearby industry. It is operated by the Institute of Technology of the University of Minnesota under the capable direction of Dr. Morris E. Nicholson. It serves about eight technology-oriented companies in Minnesota, of which IBM (Rochester, Minnesota), 3M and Univac have the largest number of employee participants.

UNITE capital investment and operating costs are borne by its industrial users; no tax monies are employed. Participating companies are offered various options in paying for UNITE; the most common is for the standard tuition charge to be combined with a per-credit operating and overhead cost fee.

UNITE instruction originates in specially equipped classrooms on campus. Each room is provided with two TV cameras. One at the rear of the room provides distance shots and close ups when the blackboard is employed. The second is overhead, and is used when the instructor writes on a desk pad.

The course is taught in front of the regular campus students, each pair of whom has a TV monitor. Thus these students have both the usual classroom view and an opportunity to see the picture going out to off-campus students.

The audio and video signals go to a remote transmitter atop a building in downtown Minneapolis. The signals for each of the two channels of operation go by microwave transmission -- which is a line-of-sight process -- to participating companies.

These companies must invest at least in antennas, signal converters, TV receivers, and dedicated classrooms. Since the system has an interactive feature, transmitters and microphones must also be provided. Probably employees will wish to record some of the lectures either for review or colleagues who are absent, so video recorders will also need to be available.

Thus the UNITE system is in essence an expanded classroom, in which all students hear and watch the lecture, may ask questions and hear responses, and may participate in discussions with the professor, on-campus students, or other off-campus students.

I turn now to what is doubtless a myopic view from the standpoint of one person -- me, with my responsibility for administering the UNITE program at 3M -- at but one of the companies participating in UNITE.

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I should make clear my belief that although my observations concerning UNITE are critical in nature, they speak to difficulties inherent in our particular situation and to some extent probably inherent in similar systems existing or proposed elsewhere. Thus these comments should not be taken as criticism of the UNITE director and his staff at the University of Minnesota.

Essentially all 3M's U. S. R&D activity takes place in the Twin Cities area, most of that in a suburb of St. Paul, Thus we have a large population -- thousands -- of technical professionals, both scientists and engineers, with additional significant numbers of supporting technical personnel.

Since 3M is a technology based company, the vitality of our technical workforce is a crucial factor in corporate success. Something as important as this requires the most creative and diligent effort by technical employees, management, and staff organizations such as the one I represent.

Our use of the UNITE system since 1972 is a part of 3M's program to encourage and facilitate appropriate continued learning by technical employees. We have five UNITE classrooms in three locations. Two of the locations are equipped for "talk-back;" all provide for video recording.

Our experience with UNITE convinces me that learning can effectively take place through this type of system and that 3M has received significant genuine value. But we are currently re-examining our UNITE participation and the sizeable financial investment involved -- almost all ultimately borne by the company rather than individual employees. I would like to share some of our experiences, and my concerns and observations.

I. Degree-Seeking Employees.

The system serves most elegantly and well those who are in degree programs. The UNITE curriculum consists of upper undergraduate and graduate courses with concentrations in electrical engineering and computer science. It is possible, for example, to accomplish very nearly all the coursework for an M. S. in Computer Science without going to the campus.

However, at 3M there is a relatively low level of degree pressure, a low level especially in masters degrees in electrical engineering and computer science. Consequently we have only a handful among our UNITE users who are in formal degree programs. UNITE is a very expensive system for these few who are best served. I wonder if it is a cost-effective use of our resources.

II. Non-Degree-Seeking Employees.

Many 3M technical people without degree interests have used UNITE. Their desire is for updating in a specific topic, for extension of knowledge, for understanding in new technologies -- all with an eye towards present and future relevance to their jobs.

These people tend to have specific learning objectives not necessarily compatible with the structure, presentation and content of academic courses. We have experimented with various approaches toward making UNITE more effective in meeting these objectives.

One approach has been to provide auditing options, so that employees could take all or part of relevant courses at low direct cost without fulfilling academic requirements, competing for a grade, or even registering with the University. This has been successful in that employee participation has generally increased, with 62% of our registrants during the past two academic years being auditors.

Many employees, particularly engineers, are less interested in engineering science than engineering practice, and are even more interested in engineering management. Very little of this is in the Institute of Technology curriculum, so another approach has been to develop special courses for UNITE. While some of these have been among the most popular with UNITE companies, UNITE was intended to expand the coverage for existing IT courses, not create new ones (with attendant higher costs).

One complication for 3M use of UNITE is that we are so diversified, in products and technologies, that identifying commonalities of learning need and interest is difficult. I'm inclined to doubt that UNITE is an appropriate, cost-effective means for meeting the needs of non-degree-seeking 3M technical employees.

III. Orientation of Course Content.

There is a basic mismatch, it seems to me, between academic and industrial information value systems. Academia tends to value information for what it is, and courses are filled with elegant theory and mathematics. Industry tends to value information for what can be done with it, and industrial students -- at least those not seeking degrees -- grow restive and unsatisfied with courses that they perceive not to sufficiently apply the knowledge to the kind of real and imperfect systems they encounter on the job.

I believe academia should concern itself more with the practical application of the mathematics and theory and with technical management. I am open to suggestion that information or knowledge for itself is undervalued in industry. But the mismatch exists and is likely to persist, and it reduces the effectiveness of UNITE in meeting recognized 3M's learning needs.

Since the University is -- understandably -- oriented strongly to its young on-campus student population and UNITE is more-or-less a freeloader, it is not surprising that the UNITE director and user companies have little influence on course content, emphasis, or effectiveness of presentation. We may not even be able to influence which of two potential instructors will teach the section televised over UNITE.

IV. UNITE Curriculum.

A further complication lies in the heterogeneity of the companies UNITE seeks to serve, especially from 3M's point of view. The principal interest among all UNITE companies is in computer science and electrical engineering, as suggested earlier. These are not 3M's principal technical interests. Since the UNITE system's financial health is directly proportional to the number of industry students, understandably curriculum concentration is in the areas of greatest total user need.

Consequently, UNITE is not seen as particularly effective in responding to 3M's special interests.

Furthermore, with the freedom so cherished in academia, with each professor lies the final authority to determine if he or she will teach a given course on UNITE. Not all professors wish to move their classes to a different building where UNITE classrooms are located, not all professors are comfortable with teaching in front of a camera and students/observers who are in part invisible to them and who may be recording the course on video-tape, not all professors are interested in responding to and interacting with industry.

Accordingly, it has not been possible to broadcast some desired courses even when a spot in the UNITE schedule was available. Specifically, 3M has considerable interests in chemistry, especially organic chemistry, analytical chemistry. It has been a slow process, not without some progress, to get chemistry courses into the UNITE program.

The matter of scheduling deserves special mention. As indicated earlier, UNITE is a sort of freeloader on a system -- the Institute of Technology -- designed to serve on-campus, full-time students proceeding through a planned sequence of study. Accordingly, the days and times when a course meets are fixed within this framework, and will not be changed to fit an open spot on the UNITE schedule, no matter how great the interest among UNITE companies. Thus, even with the willingness of all parties to televise a given course, its campus schedule must be accommodated.

One result is that, although there is "room" in the UNITE schedule for distinctly more courses, typically 20 to 22 courses are televised each quarter. Some very desirable courses, highly sought by industry students, cannot be presented because of these schedule conflicts or because they are not being taught on campus that quarter or that year.

V. Other Observations.

Our experience has indicated other areas of potential difficulty, requiring attention and planning in order to achieve best results with a system like UNITE.

1. If many students are looking for specific information from courses, rather than being on a planned degree track, the standard catalog descriptions of courses will usually be inadequate to make sound course choices. Mostly these catalog descriptions seem to be in a kind of code-jargon that can only be understood after taking the course, and even then sometimes not very descriptive.

   With the help of the UNITE director, we have been able to obtain and circulate to prospective students detailed descriptions, outlines or syllabuses for many UNITE courses. To the extent that these materials are accurate and up-to-date, they are very helpful.

2. Problem sets, student homework, supplementary handouts and tests pass between UNITE companies and the University through the U. S. mails. Even if one generously assumes the reliability of our postal system, the instructor for each course must accommodate himself to a one or two-day delay in reaching off-campus students with these materials. Thus, for example, the instructor must have a test ready not on the day it is to be given, but ready and in the mail two days before. Difficulties can and have arisen here.

   This method of transmission of course materials also requires that participating companies assign responsibility to staff to coordinate mailings and assure the security of tests between arrival and administration. In addition, as is required on-campus, UNITE testing must be proctored, requiring further staff time.

3. If a student and his or her manager know that their department is paying as much as $400 for a 4-credit course, they will probably have especially high expectations of course content, quality of presentation, and job relevance. They may be vocal and unforgiving if these expectations are not met. In addition, off-campus students may sense -- and resent -- their "second-class" status.

   Thus, from this standpoint as well, care must be taken in course and instructor selection and in publicizing courses within participating companies.

4. Conceptually, it would seem that the interactive ("talk-back") feature should be important, and when I have asked our students, via questionnaire, they have clearly supported this view. However, I understand instructors tend to feel that the talk-back capability is seldom used; they come to "wonder if anybody is out there."

   I have no statistics on frequency of use, but perhaps students value the talk-back capability more for the comfort of its availability than for their actual use of it. One of our UNITE facilities has no "talk-back," and the few students there seem not to have suffered.

These observations on the talk-back feature may betoken a future development for UNITE and like systems, a move which has already been made by one system known to me (that operated by Case-Western Reserve University). This development would be to eliminate live telecasting and instead only video-tape courses as they are taught, mail the tapes to participating companies, and provide specific telephone access to instructors. This approach would ease scheduling problems both on campus and among industrial employees, and would involve lower system costs. However, since on- and off-campus students would now not necessarily be on the same schedule, complications in homework and testing would have to be overcome.

A further point on employee scheduling is worth making. Since company students are full-time employees, their jobs come first and their courses second. Day-to-day job pressures, meetings, and travel make it very difficult to accommodate to a 3-times-a- week-for-10-weeks course. Thus many who would benefit from such courses tend to steer clear and opt instead for the short-course format, which we also employ at 3M.

However, I'm convinced that video learning is coming rapidly, and in many senses is well upon us. A video-tape oriented UNITE, with its probable greater flexibility and cost-effectiveness, might well be a needed compromise.

Summary

Our experience convinces me that live, interactive television provides for effective learning. It is most suitable for those in degree programs, who represent a very small 3M population. For those employees with learning objectives but no degree plans, the cost and common mismatch in course orientation (theory vs. practice) may render such a television system not the approach of choice. Several difficulties of the television system have been identified, and a future evolution into video-taping has been suggested.